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ECONOMIC PROFILES FOR APPLE ORCHARDS AND VINEYARDS

1981 and Five Year Average 1977-81

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FORWARD

The enterprise budgets constructed for this publication were designed to estimate returns to land for the period 1977-1981. Therefore, it is not appropriate to use these results to represent the current costs and returns for apples and grapes. At least two adjustments are necessary to allow the enterprise budgets to represent current costs and returns. These are as follows:

1. Add a land charge.
2. Update input prices and expected product prices to reflect current economic conditions.

ECONOMIC PROFILES FOR APPLE ORCHARDS AND VINEYARDS 1981 AND FIVE YEAR AVERAGE 1977-81

D.B. Whitaker and G.B. White*

INTRODUCTION

This report explains the procedures followed in constructing enterprise budgets for fresh and processing apple orchards as well as for seven grape varieties grown in New York State. An economic engineering approach similar to that discussed by Knoblauch and Milligan analyzing the principal internal and external characteristics of an average orchard or vineyard was employed.[1] The internal factors included farm size, the building and equipment complements and the management level required. In turn, the management level dictated the cultural practices to be followed including spray programs, herbicide use and pruning practices. The expenses associated with each input were identified according to actual prices in effect during the 1981 growing season. All costs were subtracted from the per acre gross revenues to produce a residual return to the land for each enterprise type.

This paper is organized into three basic sections. The first part describes the procedures followed and the elements that are common to the various types of farms. The second and third sections detail the budgeting process as it applies to the orchard and vineyard systems. Ultimately, each of the later sections produces a return to the land.

Age of the Orchards and Vineyards

In each example, the orchards or vineyards were considered to be fully developed and, therefore, in full production. The cultural practices followed were relevant for such mature systems and reflected average management of the resources.

1981 and 1977-1981 Average Prices

As noted by Knoblauch and Milligan, two sets of budget material were prepared. One budget represented the 1981 revenues and expenses, while the other described a five year, 1977-1981, average calculation. The five year period was chosen partly to help reduce any large price fluctuations that could have occurred during any one given year. Too, the 1980 Agricultural Districts legislation directed that such a five year average be considered in calculating the capitalization rate based on the effective interest rate charged on new Federal Land Bank Loans in the Springfield District.

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[1]Wayne A. Knoblauch and Robert A. Milligan, Economic Profiles for Corn, Hay and Pasture; 1981 and Five Year Average 1977-81, A.E. Ext. 82-31, (Ithaca, New York: Department of Agricultural Economics, New York State College of Agriculture and Life Sciences, Cornell University, October 1982).

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Actual price information was gathered for the 1980 and 1981 growing seasons for all the input items used on the farms. In some cases, price data were available for the entire five year period. For those items where actual prices were available for 1980 and 1981 only, proportional five year (1977-1981) prices were calculated using three years of indices published in Agricultural Prices and the two years of actual price information.[2]

Variable Growing Expenses

Management Practices

Cornell Recommendations publications and Cooperative Extension personnel provided the management techniques and input levels necessary to represent average management for the various orchard and vineyard systems.[3] Such practices are generally considered to be consistent with the yields discussed later. The spray programs, herbicide use, and fertilizer applications are detailed in the Appendix Tables' Footnotes.

Tree Prices

The fresh market orchards required replacement trees during their productive lives. Tree prices were gathered from several commercial nurseries for 1977 through 1981. Varieties included Empire, Red Delicious, Tydeman, McIntosh and Paula Red. The costs of single and interstem trees (5'-7') were averaged to obtain a price per tree of $4.99 in 1981 and $3.96 for the period, 1977-1981.

Agricultural Chemicals and Fertilizers

Both enterprise types required considerable quantities of insecticides, fungicides, herbicides and fertilizer during the growing season. Specific amounts varied with the crop and planting system and are detailed in the footnotes.

Two suppliers were contacted and asked to provide price information for these products. The suppliers were located in separate geographic areas which provided a broad representation of New York State's prices. An average was calculated and this average price appears in Appendix Tables 21 and 35.

Variable Machinery Costs

Machinery expenses included fuel, oil and lubricants as well as a charge for annual repair and maintenance.

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[2]U.S. Department of Agriculture, Agricultural Prices Annual Summary, 1981 and 1977-80, (Washington, D.C.: Government Printing Office, 1977-1980).

[3]W.C. Stiles, T.J. Burr, and H. Reidl, 1982 Cornell Recommendations for Commercial Tree Fruit Production, (Ithaca, N.Y.: New York State College of Agriculture and Life Sciences, Cornell University, 1982).

The tractors required diesel fuel priced at $1.31 per gallon as reported by the New York Crop Reporting Service in 1981.[4] Predicted consumption of fuel, lubricants and filters was estimated using the following formula:

Diesel Fuel Plus Lubricants = 0.0504 x maximum p.t.o.h.p. x fuel cost.[5]

The second portion of variable machinery expense was represented by a charge for annual repair and maintenance. These costs were directly related to the hours of use each machine received. Each operation was analyzed to determine the amount of time required to accomplish each individual orchard or vineyard task. Yearly totals were accumulated and estimated total hours of machine use were then calculated based on the number of years each implement was expected to be employed. Total repair and maintenance costs were estimated as a percent of each implement's purchase price. An hourly charge was computed using this methodology and this information appears in Appendix Tables 20 and 34. These charges as they apply to the two crop sprayers were obtained directly from the manufacturer.

Fixed Costs

Buildings and Equipment

The information presented in Appendix Tables 19 and 33 details the equipment and buildings required to operate a typical 85 acre orchard and a 55 acre vineyard in New York State. Several dealers in New York and Massachusetts were contacted for equipment price information. An average was calculated and these figures represent the amount a grower would have "reasonably expected" to spend on the implements during the 1981 season. The value of the miscellaneous shop equipment was obtained from various sources associated with the fruit industry.

Depending on the equipment, it was assumed that the machinery was purchased evenly during the preceding five, nine or ten years. Indices have been constructed using data from Agricultural Prices based on the price series, "Tractors and Other Self Propelled Machinery" as well as "Other Machinery and Implements" and five, nine or ten year rolling averages were produced to index the 1980 costs back to the five year period, 1977-1981. This five year indexed price was obtained by multiplying the 1981 cost by the appropriate index. (A complete list of all the indices utilized can be found in Appendix Table 36.)

Similarly, the cost to construct the various buildings was obtained from a large farm supply corporation serving the Northeast. The structures' dimensions and materials were specified to produce an erected price per square foot during 1981.

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[4]New York Crop Reporting Service, New York Agricultural Statistics 1981 (Albany: New York State Department of Agriculture and Markets, Division of Statistics, July 1982), p. 64.

[5]Joseph K. Campbell, Selecting Field Machinery - Estimating Cost, Agricultural Engineering Extension Bulletin 431 (Ithaca, N.Y.: Department of Agricultural Engineering, New York State College of Agriculture and Life Sciences, Cornell University, November 1978).

In the case of these buildings, a 15 year rolling average index employing the "Building and Fencing Materials" data from Agricultural Prices was calculated to produce a 1977-1981 average using the procedure described earlier. Each vineyard's trellis was indexed for a 35 year life.

Finally, a deer proof fence was added to the newer orchard systems. Information and specifications detailed by Caslick and Decker were expanded and updated to encompass our 85 acre fruit farm reaching a total cost of $16,741 in 1981.[6]

Total fixed costs associated with the equipment and buildings in both enterprise types included annual charges for depreciation, interest and repairs to the buildings and fence. Depreciation was calculated using the straight line method allowing for a 10 percent salvage value based on the equipments' purchase price. The buildings were depreciated over a 15 year period with no salvage value. Interest charges were assumed to be 11.46 percent of the average value of the investments. Average value was one-half the sum of the purchase price plus the appropriate salvage value. Annual insurance premiums were 1.5 percent of the 1977-81 cost. Building and fence repairs were estimated to be 2.5 percent of their 1977-1981 cost.

Table 1. Annual Building and Machinery Costs, Two Enterprise Types, 1977-81 Basis

Type of Charge	Enterprise	
	Orchard	Vineyard
Depreciation	$12,706	$ 3,211
Interest	7,852	2,158
Insurance	1,910	524
Repairs, buildings and fence	757	195
Total	$23,225	$ 6,088
Number of acres	÷85	÷55
Fixed Cost Per Acre	$273.24	$110.69

Total annual building and machinery costs for the orchard systems were $23,225, while the corresponding figure for the vineyards was $6,088 (Table 1). As noted earlier, the orchards contained 85 acres of fruit trees. The vineyards had 55 total acres. Consequently, the relevant fixed cost per acre for the orchards was $273.24 and for the vineyards, $110.69. These two items appear in subsequent income and expense schedules. The expenses associated with each vineyard's trellis were treated as a separate per acre fixed cost as indicated in Appendix Table 33.

6J.W. Caslick and D.H. Decker, "Benefit-Cost Analysis of a Deer-Proof Fence for Apple Orchards," Conservation Circular 15(4), (Ithaca, N.Y.: Department of Natural Resources, New York State College of Agriculture and Life Sciences, Cornell University, Winter 1979).

Orchard Production Costs

As noted earlier, the six orchard systems were considered to be mature, fully productive blocks of fruit. Average management dictated the cultural practices detailed in the appendix tables. Pruning expenses were represented by 30 hours of labor per acre on the newer systems and 27.3 hours on the standard tree system. The spray programs, herbicide treatments and other growing practices have been summarized in tables 2 and 3 below. Both the 1981 costs and the five year average costs have been presented.

The annual growing costs associated with the older orchard system containing 27 trees per acre are listed in Table 3.

Table 2. Production Costs, Two Mature Orchard Systems Intended for Fresh Use, 121 and 218 Trees Per Acre, 1981 and 1977-81 Average

Operation	Item Total, 1981 Trees Per Acre		Item Total, 1977-81 Average Trees Per Acre	
	121	218	121	218
Herbicide (2x)	$ 22.12	$ 22.12	$ 19.32	$ 19.32
Spraying (12x)	256.10	256.10	223.42	223.42
Chemical thinning	9.60	9.60	8.03	8.03
Prune and train	148.50	148.50	128.10	128.10
Mousebait	7.10	7.10	6.11	6.11
Fertilizer	30.59	52.70	24.96	42.98
Mow (5x)	50.07	50.07	40.23	40.23
Tree replacement	19.92	33.37	16.15	27.06
Brush removal	39.51	39.51	32.36	32.36
Lime	13.65	13.65	10.94	10.94
Bee rental	8.33	8.33	7.08	7.08
Other	30.56	30.56	25.22	25.22
Total	$636.05	$671.61	$541.92	$570.85

Table 3. Production Costs, Mature Low Density Apple Orchard Intended for Fresh Use, 27 Trees Per Acre, 1981 and 1977-81 Average

Item	Item Total, 1981	Item Total, 1977-81 Average
Herbicide (2x)	$ 13.85	$ 12.21
Spraying (12x)	267.75	238.13
Chemical thinner	7.84	6.63
Prune and train	135.00	116.57
Mousebait	7.10	6.11
Fertilizer	7.00	5.71
Mow (5x)	50.07	40.23
Brush removal	24.71	20.45
Lime	13.65	10.94
Bee rental	8.33	7.08
Other	30.56	25.22
Total	$565.86	$489.28

Income and Expenses

The fixed and variable cost information has been combined with gross revenue calculations to produce the income and expense schedules for the various orchards. For growers marketing fresh fruit, it was assumed that a portion was used for juice and cider. Adjustments in sales were made as shown in the following table.

Table 4. Apple Pack-Out, Three Mature Orchard Systems Intended for Fresh Use, 27, 121, and 218 Trees Per Acre, 1977-81 Average

Utilization	Number of Trees Per Acre		
	27	121	218
Percent Sold as Fresh Market Apples	70	80	85
Percent Sold for Juice and Cider	30	20	15
	100	100	100

Income

Gross revenue was calculated by multiplying the average price per bushel by the assumed per acre yield. These yields were considered to be attainable following the management practices outlined in the appendix tables and footnotes. This production information was based on research and extension experience at Cornell University.

The average fresh market apple price for the months of October and November recorded by the New York Crop Reporting Service from the period, 1977-81, was used as a base price.[7] This figure was reduced based on a study of the proportional deductions from gross sales reported by several New York State fruit packing firms. In addition, an analysis of the State's sales of apples through these packing companies and other outlets was included in this adjustment. Furthermore, the reported 1977-81 average annual price of juice and cider apples was lowered from $1.81 to $.96 per 42 pound bushel following these guidelines.[8]

As noted earlier, this analysis assumed that a portion of the yield was sold as fresh fruit and the remainder was used to produce juice and cider. Consequently, a weighted average price that considered both utilizations was necessary. The fresh market price was adjusted to conform with the proportional pack-out described in Table 4.

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[7] Agricultural Prices Annual Summary, 1977-81.

[8] New York Crop Reporting Service, "1981 Apples Processed in New York," Fruit, No. 4-82 (Albany: New York Department of Agriculture and Markets, Division of Statistics, July 19, 1982).

Table 5. Weighted Average Price Per Bushel, Three Mature Orchard Systems Intended for Fresh Use, 27, 121, and 218 Trees Per Acre, 1977-81 Average

	Number of Trees Per Acre		
	27	121	218
Packed Fresh Market Price	$4.13	$4.13	$4.13
Percent Sold as Fresh Market Apples	x .70	x .80	x .85
Fresh Market Proportion	$2.89	$3.30	$3.51
Juice and Cider Price	$ .96	$ .96	$ .96
Percent Sold for Juice and Cider	x .30	x .20	x .15
Juice and Cider Proportion	$ .29	$ .19	$ .14
Weighted Average Price	$3.18	$3.49	$3.65

Expenses

The expenses associated with the three systems were classified as fixed or variable as indicated on the income schedules. The fixed expenses including charges for depreciation, interest, insurance and repairs (when appropriate) on the buildings and equipment have been described previously. These costs were entered in the appropriate spaces in Table 6. The variable expenses are discussed briefly below.

Growing Costs

The 1981 and average, 1977-81, variable growing costs have been accumulated in Tables 2 and 3. The five year average expenses have been transferred to the income schedule, Table 6.

Harvesting Costs

This item was provided by a series of studies (1977-81) of growers operating in the Hudson Valley conducted by Cooperative Extension personnel.[9] Their estimated cost included a per bushel charge to cover the depreciation and interest associated with the apple containers. This charge has been deducted in this analysis since these bins were included in the equipment complement (Appendix Table 20) and were, therefore, a part of the fixed costs. The resulting 94.4¢ was multiplied by the yield in bushels to provide a total harvesting expense.

[9]William D. Gerling, A Survey of the Cost of Growing and Harvesting Apples in Eastern New York, 1979-1981 (Highland, N.Y.: Cooperative Extension, Hudson Valley Laboratory, Cornell University, 1977-81). Ralph T. Lawrence, A Survey of the Cost of Growing and Harvesting Apples in Eastern New York, 1977 and 1978 (Highland, N.Y.: Cooperative Extension, Hudson Valley Laboratory, Cornell University, 1977 and 1978).

Table 6. Revised Income and Expenses Per Acre, Three Mature Orchard Systems Intended for Fresh Use, 27, 121 and 218 Trees Per Acre, 1977-81 Average

Item	Number of Trees Per Acre		
	27	121	218
Income:			
Yield, Bushels/Acre	450	500	570
Price/Bushel	$3.18	$3.49	$3.65
Value of Production	$1,431	$1,745	$2,081
Expenses:			
Variable			
Growing	$ 489	$ 542	$ 571
Harvesting	425	472	538
Transportation to Packer	54	61	69
Interest	28	31	33
Management	72	87	104
Fixed			
Equipment and Buildings	$ 256	$ 273	$ 273
Expenses Before Property Taxes	$1,324	$1,466	$1,588
Income Before Property Taxes	$ 107	$ 279	$ 493
Property Taxes	$ 14	$ 34	$ 57
Total Expenses	$1,338	$1,500	$1,645
Return to Land	$ 93	$ 245	$ 436

Transportation to Packer

Estimated costs to transport a grower's fruit from the farm to the packing house during the 1977-81 period were 12.1¢ per bushel. This figure included a labor expense as well as a charge for the truck's operation. It was assumed that two hours of labor were required to load and unload the apples and complete a 40 mile round trip.

Interest and Management Expense

The five year (1977-81) average short term interest rate charged by the Production Credit Associations in the Springfield District was 11.46 percent.[10] This rate was levied on the operating capital committed to the variable growing costs for six months in both enterprise types. Furthermore, a management charge of five percent of the value of production was included to represent the grower's input in operating the farm.

Fixed Expenses

The annual depreciation, interest, insurance and appropriate repair costs associated with the orchards' equipment and buildings were $273 for the two newer systems (Table 1). However, the $17.00 per acre charge representing the fixed costs of the deer fence have been eliminated on the standard 27 trees per acre planting. It was concluded that growers would not commit the capital necessary to erect such a fence on these older blocks of fruit.

Income and Expense Schedules

All of the orchard income and expense items are summarized in Table 6 as well as in the Appendix. The resulting "Income Before Property Taxes" can be used as the basis for determining property taxes, a return to land, and a capitalized land value.

Processing Apple Orchards

The cultural practices and production costs associated with processing apple orchards were also analyzed. The same planting systems, 27, 121 and 218 trees per acre were included. Once again, it was assumed that the orchards were fully developed and in full production. Consequently, the production costs for the fresh market/juice and cider orchards were adjusted to produce these budgets.

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[10]Knoblauch and Milligan, p. 24.

Table 7. Mature Processing Apple Orchard Production Costs, Two Orchard Systems, 121 and 218 Trees Per Acre, 1981 and 1977-81 Average

Operation	Item Total, 1981 Trees Per Acre		Item Total, 1977-81 Average Trees Per Acre	
	121	218	121	218
Herbicide	$ 12.23	$ 12.23	$ 10.70	$ 10.70
Spraying (9x)	133.98	133.98	114.70	114.70
Chemical thinning	9.60	9.60	8.03	8.03
Prune and train	118.80	118.80	102.48	102.48
Mousebait	7.10	7.10	6.11	6.11
Fertilizer	38.21	66.44	30.40	52.78
Mow (4x)	39.50	39.50	31.74	31.74
Brush removal	24.71	24.71	20.45	20.45
Lime	13.65	13.65	10.94	10.94
Bee rental	8.33	8.33	7.08	7.08
Other	30.56	30.56	25.22	25.22
Total	$436.67	$464.90	$367.85	$390.23

For example, pruning costs were estimated to be 80 percent of the requirements necessary to maintain the fresh/juice and cider orchards. Similarly, orchard floor maintenance was reduced as compared to the other systems. The spray programs were also adjusted as noted in the production tables' footnotes. However, some expenses including chemical thinning, mouse control and the lime application remained the same. Fertilizer costs were budgeted at a level higher than noted in the fresh market systems.

Income and Expenses - Processing Apples

Income and expense schedules were also prepared for the processing apple orchards. Per acre yields were estimated to be approximately 10 percent higher than the equivalent fresh/juice and cider orchards' planting system. The 1977-81 average annual price per 42 pound bushel (less the Marketing Order Assessment) reported by the New York Crop Reporting Service was $2.19.[11] The variable expenses were generally calculated as before. However, extension personnel estimated that processing apple harvesting costs were 8.6¢ per bushel less than those reported for the fresh/juice and cider orchards. Too, the fixed costs associated with the apple bins and deer control fence were eliminated as these items were not generally purchased by these growers. The completed income and expense schedules appear in the appendix and this information is also presented in Table 9.

[11] New York Crop Reporting Service, "1981 Apples Processed in New York," Fruit No. 4-82.

Table 8. Mature Low Density Processing Apple Orchard Production Costs, 27 Trees Per Acre, 1981 and 1977-81 Average

Operation	Item Total, 1981	Item Total, 1977- 81 Average
Herbicide	$ 10.00	$ 8.85
Spraying (9x)	142.82	125.77
Chemical thinner	7.84	6.64
Prune and train	108.00	93.09
Mousebait	7.10	6.11
Fertilizer	8.70	6.91
Mow (4x)	39.50	31.74
Brush removal	24.71	20.45
Lime	13.65	10.94
Bee rental	8.33	7.08
Other	30.56	25.22
Total	$401.21	$342.80

Table 9. Revised Income and Expenses Per Acre, Three Mature Processing Apple Orchard Systems, 27, 121 and 218 Trees Per Acre, 1977-81 Average

Item	Number of Trees Per Acre		
	27	121	218
Income:			
Yield, Bushels/Acre	500	550	625
Price/Bushel	$2.19	$2.19	$2.19
Value of Production	$1,095	$1,205	$1,369
Expenses:			
Variable			
Growing	$ 343	$ 368	$ 390
Harvesting	429	472	536
Transportation to Packer	61	67	76
Interest	20	21	22
Management	55	60	68
Fixed			
Equipment and Buildings	214	214	214
Expenses Before Property Taxes	$1,113	$1,193	$1,297
Income Before Property Taxes	$ 0	$ 12	$ 72
Property Taxes	$ 2	$ 4	$ 10
Total Expenses	$1,115	$1,197	$1,307
Return to Land	$ 0	$ 8	$ 62

Vineyard Production Costs

The procedures described in the vineyards' analysis were similar to those followed in the discussion of the orchard systems. In this instance, however, seven different grape varieties were analyzed. Five native vineyards including Concord, Catawba, Niagara, Delaware and Dutchess and two French hybrids (Aurore and deChaunac) have been evaluated. The native vines were planted at a 9' x 8' spacing which utilized 605 vines per acre. The French hybrids were planted using 691 vines per acre. The cultural practices required to grow the native grapes were nearly identical. Therefore, their annual costs were equally weighted to produce one "average" set of budgets. A separate series of information was established to describe the practices followed in growing the French hybrids. Important differences in these requirements and expenses are noted in the text. However, a complete and separate discussion of the Aurore and de Chaunac varieties is not included due to the repetitive nature of the steps followed.

The vineyards were also considered to be fully developed and at their full production levels. Cooperative Extension personnel provided advice concerning the growing practices detailed in the appendix and summarized in Table 10.

Table 10. Mature Vineyard Production Costs, Five Native Varieties and Two French Hybrids, 605 or 691 Vines Per Acre, 1981 and 1977-81 Average

Operation	Item Total, 1981		Item Total, 1977-81 Average	
	Five Native Varieties	Two French Hybrids	Five Native Varieties	Two French Hybrids
Fall fertilization	$ 13.46	$ 13.46	$ 11.05	$ 11.05
Pruning	133.10	152.02	114.86	131.09
Brush pulling	19.97	22.80	17.08	19.64
Brush chopping	5.43	5.43	4.48	4.48
Thinning	--	74.25	--	64.05
Trellis maintenance	13.87	13.87	11.84	11.84
Tying	104.74	104.74	90.12	90.12
Spring fertilizer	26.16	26.16	20.90	20.90
Layering	9.90	9.90	8.54	8.54
Weed spray	28.83	28.83	24.61	24.61
Suckering and sprouting	14.85	44.55	12.81	38.43
Diseased and dead trunk removal	4.95	9.90	4.27	8.54
Tillage (2x)	30.27	30.27	24.74	24.74
Tillage (1x)	14.01	14.01	11.51	11.51
Spraying (4x)	66.94	75.94	58.60	66.74
Cover crop	14.19	14.19	11.83	11.83
Mowing	5.59	5.59	4.60	4.60
Push-up	4.09	4.09	3.35	3.35
Lime	3.20	3.20	3.00	3.00
Other	30.56	30.56	25.22	25.22
Total	$544.11	$683.76	$463.41	$584.28

The French hybrids have a tendency to over produce. Consequently, the Aurore and de Chaunac vineyards were thinned at a cost of $74.25 per acre in 1981. This operation was not necessary in the production of the native varieties. In addition, the amount of labor required for suckering and sprouting in the French hybrids was triple the amount required for the native varieties. Finally, the costs associated with the insecticide/fungicide spray program applied to the French hybrids were approximately 13 percent higher than those associated with the native grapes.

However, many of the growing expenses were equal in both types of vineyards. Fertilization, pruning, trellis maintenance and herbicide treatments were all the same. Total growing costs were $544 for the natives and $684 for the French hybrids during the 1981 season. These figures have all been averaged for the 1977-1981 period as well.

Income

The average annual New York State price for the various grapes has been calculated for the five year period, 1977-81.[12] A range of attainable yields was included in the per acre production figure. These yields were based on the weighted average of the State's acres of vineyards in their first, second and "mature" years of production as published in the New York Orchard and Vineyard Survey, 1980. In each instance, the yield estimate employed was the full production figure. Complete income and expense information has been summarized in Table 11.

Expenses

The expenses experienced by the vineyard enterprises were classified as fixed or variable. The fixed costs attributed to the machinery, building and trellis were described earlier and appear in Table 1 and in the Appendix Tables. As noted, certain production practices have ultimately made the French hybrids' annual growing costs some 26 percent higher than the same figure associated with the native varieties.

Harvesting, Interest and Management Expense

Industry sources indicated average machine harvesting and hauling charges were $35.00 per ton during the 1980 and 1981 growing seasons. This paper's indexing procedure resulted in a 1977-81 average charge of $29.45 per ton for these services. This item's total varied with each variety as the vineyards' yields changed.

Interest expenses of $27 per acre were included for the five native grapes and this charge was $33 per acre for the French hybrids. This represented a

[12]New York Crop Reporting Service, "Survey of Wineries and Grape Processing Plants, New York," Fruit, (Albany: U.S. Department of Agriculture, Statistical Reporting Service, New York Department of Agriculture and Markets, Division of Statistics, 1977-1982).

rate of 11.46% levied on the variable production costs for six months. Management expenses equal to five percent of the value of each vineyard's production were also included. During the five year period, these costs ranged from a low of $44 per acre in the Concord and Dutchess vineyards to a high of $64 per acre represented by the Aurore grapes. These income and expense items have been used to calculate property taxes, returns to the land as well as capitalized land values.

Table 11. Revised Income and Expenses, Seven Vineyard Varieties, 605 or 691 Vines Per Acre, 1977-81 Average

	Concord	Catawba	Niagara	Delaware	Dutchess	Aurore	de Chaunac
Income:							
Yield, tons/acre	4.30	3.12	3.81	2.55	1.96	3.66	3.92
Price, $/ton	$203	$289	$239	$391	$446	$352	$265
Value of Production	$873	$902	$911	$997	$874	$1,288	$1,039
Expenses:							
Variable							
Growing	$463	$463	$463	$463	$463	$ 584	$ 584
Harvesting	127	92	112	75	58	108	115
Interest	27	27	27	27	27	33	33
Management, 5% of value	44	45	46	50	44	64	52
Fixed							
Equipment and buildings	124	124	124	124	124	124	124
Trellis	49	49	49	49	49	49	49
Expenses Before Property Taxes	$821	$787	$808	$775	$752	$949	$944
Income Before Property Taxes	$ 52	$115	$103	$222	$122	$339	$ 95
Property Taxes	$ 8	$ 16	$ 14	$ 30	$ 17	$ 45	$ 13
Total Expenses	$829	$803	$822	$805	$769	$994	$957
Return to Land	$ 44	$ 99	$ 89	$192	$105	$294	$ 82

SUPPORTING INFORMATION

Tables 1 - 36

ORCHARD APPENDIX TABLES

Table 1. Income and Expenses for a Mature Medium Density, 85 Percent Fresh and 15 Percent Juice and Cider Utilization Apple Orchard, 218 Trees Per Acre, 1977-1981 Basis

Item	1977-81 Average
Income	
Yield, bushels/acre	570
Price, $ per bushel[1]	$3.65
Value of production	$2,081
Expenses	
Variable	
Growing	$ 571
Harvesting[2]	538
Transportation to packer[3]	69
Interest[4]	33
Management, 5% of value	104
Fixed	
Equipment and buildings	273
Expenses Before Property Taxes	$1,588
Property Taxes	$ 57
Total Expenses	$1,645
Return to Land	$ 436

[1]1977-81 average price for fresh apples in October and November reported by the New York Crop Reporting Service and the annual average price for juice and cider apples. 85% of the yield is sold as fresh market apples, and 15% is sold for juice and cider. Deductions from gross receipts have been made based on a study of several New York State packing firms.

Net Fresh Price	$4.13 per bushel
Juice and Cider Price	.96 per bushel

$4.13 x 85% = $3.51 - Fresh Market Proportion
.96 x 15% = .14 - Juice and Cider Proportion
$3.65 "Average" Price Per Bushel

[2]Harvesting costs of 94.4¢ per bushel during 1977-81 based on Gerling, W.D., A Survey of the Cost of Growing and Harvesting Apples in Eastern New York, 1979-81, and Lawrence, Ralph T., A Survey of the Cost of Growing and Harvesting Apples in Eastern New York, 1977 and 1978, Cooperative Extension, Hudson Valley Laboratory, Highland, New York. Their cost per bushel included charges for depreciation and interest on containers. These charges were deducted because our equipment set includes containers.

[3]Transportation and labor charge of 12.1¢ per bushel.

[4]Interest @ 11.46% on growing costs for 6 months.

Table 2. Mature Medium Density, 85 Percent Fresh and 15 Percent Juice and Cider Utilization Apple Orchard Production Costs, 218 Trees Per Acre, 1981 Basis

Operation	Labor Hours	Equipment Hours	Labor Cost	Equipment Cost	Materials Cost	Total
Herbicide (2x)[1]	1.3	1.0	$ 6.44	$ 3.70	$ 11.98	$ 22.12
Spraying (12x)[2]	5.2	4.0	25.74	51.12	179.24	256.10
Chemical thinner[3]	.4	.3	1.98	3.83	3.79	9.60
Prune and train	30.0	--	148.50	--	--	148.50
Mousebait[4]	.4	.3	1.98	1.02	4.10	7.10
Fertilizer	.4	.3	1.98	1.02	49.70	52.70
Mow (5x)	4.3	3.3	21.29	28.78	--	50.07
Tree replacement[5]	1.7	--	8.42	--	24.95	33.37
Brush removal[6]	4.6	2.0	22.77	16.74	--	39.51
Lime[7]	custom	--	--	--	13.65	13.65
Bee rental[8]	--	--	--	--	8.33	8.33
Other[9]						30.56
Total	48.3	11.2	$239.10	$106.21	$295.74	$671.61

1/ Karmex and Sinbar Spray

Karmex	2 lbs	$ 7.76
Sinbar	1 lb	14.50
Spreader sticker	4 oz	.37
Target N.L.	8 oz	.41
		$23.04
30% area sprayed		$ 6.91

Dacamine Spray

Dacamine	1 qt	$ 4.29
Spreader sticker	4 oz	.37
Target N.L.	8 oz	.41
		$ 5.07
Full area sprayed		$ 5.07

2/

Captan	4 lbs	$ 6.00	12 sprays	$ 72.00
Guthion	1.5 lbs	6.66	5 sprays	33.30
Thiodan	2.5 lbs	9.25	2 sprays	18.50
Plictran	10 oz	10.94	2 sprays	21.88
Alar	2 lbs	33.56	1 spray	33.56
(12 applications with spray equipment as some sprays are combined)				
Total				$179.24

3/ Thinning Spray

Fructone N	2 oz	$ .59
Sevin	2 lbs	3.20
		$3.79

4/ Mousebait
Zinc Phosphide Corn - 10 lbs/acre $4.10

5/ Tree replacement
Five trees per year costing $4.99 each

6/ Brush removal
Two additional labor hours per acre are required to prepare brush for chopping.

7/ Lime
Custom application every 5 years to maintain soil ph 5.6 - 6.0.
3 tons/acre x $22.75/ton - $68.25 ($13.65 per year)

8/ Bee rental
One hive per 3 acres at $25.00/hive

9/ Includes charges for liability insurance, utilities, and office/accounting expenses.

Table 3. Mature Medium Density, 85 Percent Fresh and 15 Percent Juice and Cider Utilization Apple Orchard Production Costs, 218 Trees Per Acre, 1977-1981 Basis

Item	Item Total 1981	Item Total 1977-1981 Average
Labor	$239.10	$206.24
Equipment	106.21	80.72
Fertilizer	49.70	40.49
Mousebait	4.10	3.62
Chemical thinner	3.79	3.41
Herbicides	11.98	10.96
Spray Materials	179.24	162.37
Tree replacement	24.95	19.80
Lime	13.65	10.94
Bee rental	8.33	7.08
Other	30.56	25.22
Total		$570.85

Table 4. Income and Expenses for a Mature Low Density, 80 Percent Fresh and 20 Percent Juice and Cider Utilization Apple Orchard, 121 Trees Per Acre, 1977-81 Basis

Item	1977-81 Average
Income	
Yield, bushels/acre	500
Price, $ per bushel[1]	$3.49
Value of production	$1,745
Expenses	
Variable	
Growing	$ 542
Harvesting[2]	472
Transportation to packer[3]	61
Interest[4]	31
Management, 5% of value	87
Fixed	
Equipment and buildings	273
Expenses Before Property Taxes	$1,466
Property Taxes	$ 34
Total Expense	$1,500
Return to Land	$ 245

[1]1977-81 average price for fresh apples in October and November reported by the New York Crop Reporting Service and the annual average price for juice and cider apples. 80% of the yield is sold as fresh market apples, and 20% is sold for juice and cider. Deductions from gross receipts have been made based on a study of several New York State packing firms.

Net Fresh Price	$4.13 per bushel
Juice and Cider Price	.96 per bushel

$4.13 x 80% = $3.30 - Fresh Market Proportion
.96 x 20% = .19 - Juice and Cider Proportion
$3.49 "Average" Price Per Bushel

[2]Harvesting costs of 94.4¢ per bushel during 1977-81 based on Gerling, W.D., A Survey of the Cost of Growing and Harvesting Apples in Eastern New York, 1979-81, and Lawrence, Ralph T., A Survey of the Cost of Growing and Harvesting Apples in Eastern New York, 1977 and 1978, Cooperative Extension, Hudson Valley Laboratory, Highland, New York. Their cost per bushel included charges for depreciation and interest on containers. These charges were deducted because our equipment set includes containers.

[3]Transportation and labor charge of 12.1¢ per bushel.

[4]Interest @ 11.46% on growing costs for 6 months.

Table 5. Mature Low Density, 80 Percent Fresh and 20 Percent Juice and Cider Utilization Apple Orchard Production Costs, 121 Trees Per Acre, 1981 Basis

Operation	Labor Hours	Equipment Hours	Labor Cost	Equipment Cost	Materials Cost	Total
Herbicide (2x)[1]	1.3	1.0	$ 6.44	$ 3.70	$ 11.98	$ 22.12
Spraying (12x)[2]	5.2	4.0	25.74	51.12	179.24	256.10
Chemical thinner[3]	.4	.3	1.98	3.83	3.79	9.60
Prune and train	30.0	--	148.50	--	--	148.50
Mousebait[4]	.4	.3	1.98	1.02	4.10	7.10
Fertilizer	.4	.3	1.98	1.02	27.59	30.59
Mow (5x)	4.3	3.3	21.29	28.78	--	50.07
Tree replacement[5]	1.0	--	4.95	--	14.97	19.92
Brush removal[6]	4.6	2.0	22.77	16.74	--	39.51
Lime[7]	custom	--	--	--	13.65	13.65
Bee rental[8]	--	--	--	--	8.33	8.33
Other[9]						30.56
Total	47.6	11.2	$235.63	$106.21	$263.65	$636.05

1/ Karmex and Sinbar Spray

Karmex	2 lbs	$ 7.76
Sinbar	1 lb	14.50
Spreader sticker	4 oz	.37
Target N.L.	8 oz	.41
		$23.04
30% area sprayed		$ 6.91

Dacamine Spray

Dacamine	1 qt	$ 4.29
Spreader sticker	4 oz	.37
Target N.L.	8 oz	.41
		$ 5.07
Full area sprayed		$ 5.07

2/

Captan	4 lbs	$ 6.00	12 sprays	$ 72.00
Guthion	1.5 lbs	6.66	5 sprays	33.30
Thiodan	2.5 lbs	9.25	2 sprays	18.50
Plictran	10 oz	10.94	2 sprays	21.88
Alar	2 lbs	33.56	1 spray	33.56
(12 applications with spray equipment as some sprays are combined)				
Total				$179.24

3/ Thinning Spray

Fructone N	2 oz	$ .59
Sevin	2 lbs	3.20
		$3.79

4/ Mousebait
Zinc Phosphide Corn - 10 lbs/acre $4.10

5/ Tree replacement
Three trees per year costing $4.99 each

6/ Brush removal
Two additional labor hours per acre are required to prepare brush for chopping.

7/ Lime
Custom application every 5 years to maintain soil ph 5.6 - 6.0.
3 tons/acre x $22.75/ton - $68.25 ($13.65 per year)

8/ Bee rental
One hive per 3 acres at $25.00/hive

9/ Includes charges for liability insurance, utilities, and office/accounting expenses.

Table 6. Mature Low Density, 80 Percent Fresh and 20 Percent Juice and Cider Utilization Apple Orchard Production Costs, 121 Trees Per Acre, 1977-1981 Basis

Item	Item Total 1981	Item Total 1977-1981 Average
Labor	$235.63	$203.25
Equipment	106.21	80.72
Fertilizer	27.59	22.47
Mousebait	4.10	3.62
Chemical thinner	3.79	3.41
Herbicides	11.98	10.96
Spray Materials	179.24	162.37
Tree replacement	14.97	11.88
Lime	13.65	10.94
Bee rental	8.33	7.08
Other	30.56	25.22
Total		$541.92

Table 7. Income and Expenses for a Mature Low Density, 70 Percent Fresh and 30 Percent Juice and Cider Utilization Apple Orchard, 27 Trees Per Acre, 1977-1981 Basis

Item	1977-81 Average
Income	
Yield, bushels/acre	450
Price, $ per bushel[1]	$3.18
Value of production	$1,431
Expenses	
Variable	
Growing	$ 489
Harvesting[2]	425
Transportation to packer[3]	54
Interest[4]	28
Management, 5% of value	72
Fixed	
Equipment and buildings[5]	256
Expenses Before Property Taxes	$1,324
Property Taxes	$ 14
Total Expenses	$1,338
Return to Land	$ 93

[1]1977-81 average price for fresh apples in October and November reported by the New York Crop Reporting Service and the annual average price for juice and cider apples. 70% of the yield is sold as fresh market apples, and 30% is sold for juice and cider. Deductions from gross receipts have been made based on a study of several New York State packing firms.

Net Fresh Price	$4.13 per bushel
Juice and Cider Price	.96 per bushel

$4.13 x 70% =	$2.89	- Fresh Market Proportion
.96 x 30% =	.29	- Juice and Cider Proportion
	$3.18	"Average" Price Per Bushel

[2]Harvesting costs of 94.4¢ per bushel during 1977-1981 based on Gerling, W.D., A Survey of the Cost of Growing and Harvesting Apples in Eastern New York, 1979-81, and Lawrence, Ralph T., A Survey of the Cost of Growing and Harvesting Apples in Eastern New York, 1977 and 1978, Cooperative Extension, Hudson Valley

Laboratory, Highland, New York. Their cost per bushel included charges for depreciation and interest on containers. These charges were deducted because our equipment set includes containers.

[3]Transportation and labor charge of 12.1¢ per bushel.

[4]Interest @ 11.46% on growing costs for 6 months.

[5]Fixed costs of $17 per acre associated with the deer control fence have been excluded.

Table 8. Mature Low Density, 70 Percent Fresh and 30 Percent Juice and Cider Utilization Apple Orchard Production Costs, 27 Trees Per Acre, 1981 Basis

Operation	Labor Hours	Equipment Hours	Labor Cost	Equipment Cost	Materials Cost	Total Cost
Herbicide (2x)[1]	.7	.5	$ 3.47	$ 1.85	$ 8.53	$ 13.85
Spraying (12x)[2]	2.6	2.0	12.87	25.56	229.32	267.75
Chemical thinning[3]	.3	.2	1.49	2.56	3.79	7.84
Prune and train[4]	27.3	--	135.00	--	--	135.00
Mousebait[5]	.4	.3	1.98	1.02	4.10	7.10
Fertilizer	.1	.1	.50	.34	6.16	7.00
Mow (5x)	4.3	3.3	21.29	28.78	--	50.07
Brush removal[6]	3.3	1.0	16.34	8.37	--	24.71
Lime[7]	custom	--	--	--	13.65	13.65
Bee rental[8]	--	--	--	--	8.33	8.33
Other[9]						30.56
Total	39.0	7.4	$192.94	$68.48	$273.88	$565.86

1/ Herbicide

Karmex and Sinbar Spray

Karmex	2 lbs	$ 7.76
Sinbar	1 lb	14.50
Spreader sticker	4 oz	.37
Target N.L.	8 oz	.41
		$23.04
15% area sprayed		$ 3.46

Dacamine Spray

Dacamine	1 qt	$ 4.29
Spreader sticker	4 oz	.37
Target N.L.	8 oz	.41
		$ 5.07

Full area sprayed	$5.07
Karmex and Sinbar	3.46
Total	$8.53

2/ Spray Program

Captan	6 lbs	$ 9.00	6 sprays	$54.00
Captan	4 lbs	6.00	4 sprays	24.00
Guthion	2 lbs	8.88	5 sprays	44.40
Thiodan	4 lbs	14.80	2 sprays	29.60
Plictran	20 oz	21.88	2 sprays	43.76
Alar	2 lbs	33.56	1 spray	33.56
Total				$229.32

(12 applications with spray equipment as some sprays are combined)

3/ Thinning Spray

Fructone N	2 oz	$ .59
Sevin	2 lbs	3.20
		$3.79

4/ Prune and Train

$5.00 per tree

5/ Mousebait
Zinc phosphide corn 10 lbs/acre $4.10

6/ Brush Removal
Two additional labor hours per acre are required to prepare brush for chopping.

7/ Lime
Custom application every 5 years to maintain soil ph of 5.6 - 6.0.
3 tons/acre x $22.75/ton = $68.25 ($13.65 per year)

8/ Bee Rental
One hive per 3 acres at $25.00/hive

9/ Includes charges for liability insurance, utilities and office/ accounting expenses.

Table 9. Mature Low Density, 70 Percent Fresh and 30 Percent Juice and Cider Utilization Apple Orchard Production Costs, 27 Trees Per Acre, 1977-1981 Basis

Item	Item Total 1981	Item Total 1977-1981 Average
Labor	$192.94	$166.53
Equipment	68.48	52.04
Fertilizer	6.16	5.02
Mousebait	4.10	3.62
Chemical thinner	3.79	3.41
Herbicides	8.53	7.82
Spray Materials	229.32	207.60
Lime	13.65	10.94
Bee rental	8.33	7.08
Other	30.56	25.22
Total		$489.28

Table 10. Income and Expenses for a Mature Medium Density, Processing Apple Orchard, 218 Trees Per Acre, 1977-81 Basis

Item	1977-81 Average
Income	
Yield, bushels/acre	625
Price, $ per bushel[1]	$2.19
Value of production	$1,369
Expenses	
Variable	
Growing	$ 390
Harvesting[2]	536
Transportation to packer[3]	76
Interest[4]	22
Management, 5% of value	68
Fixed	
Equipment and buildings[5]	205
Expenses Before Property Taxes	$1,297
Property Taxes	10
Total Expenses	$1,307
Return to Land	$ 62

[1]1977-81 average price for processing apples reported by the New York Crop Reporting Service, less Marketing Order assessment.

[2]Harvesting costs of 85.8¢ per bushel during 1977-1981 based on Gerling, W.D., A Survey of the Cost of Growing and Harvesting Apples in Eastern New York, 1979-81, and Lawrence, Ralph T., A Survey of the Cost of Growing and Harvesting Apples in Eastern New York, 1977 and 1978, Cooperative Extension, Hudson Valley Laboratory, Highland, New York. Their cost per bushel included charges for depreciation and interest on containers. These charges were deducted because our equipment set includes containers. Cooperative Extension personnel estimated that processing apples required 8.6¢/bushel less to harvest than fresh apples.

[3]Transportation and labor charge of 12.1¢ per bushel.

[4]Interest @ 11.46% on growing costs for 6 months.

[5]Fixed costs of $68 per acre associated with the deer control fence and apple bins have been excluded.

Table 11. Mature Medium Density, Processing Apple Orchard Production Costs, 218 Trees Per Acre, 1981 Basis

Operation	Labor Hours	Equipment Hours	Labor Cost	Equipment Cost	Materials Cost	Total Cost
Herbicide[1]	.7	.5	$ 3.47	$ 1.85	$ 6.91	$ 12.23
Spraying (9x)[2]	3.9	3.0	19.31	38.34	76.33	133.98
Chemical thinning[3]	.4	.3	1.98	3.83	3.79	9.60
Prune and train[4]	24.0	--	118.80	--	--	118.80
Mousebait[5]	.4	.3	1.98	1.02	4.10	7.10
Fertilizer	.4	.3	1.98	1.02	63.44	66.44
Mow (4x)	3.4	2.6	16.83	22.67	--	39.50
Brush removal[6]	3.3	1.0	16.34	8.37	--	24.71
Lime[7]	custom	--	--	--	13.65	13.65
Bee rental[8]	--	--	--	--	8.33	8.33
Other[9]						30.56
Total	36.5	8.0	$180.69	$77.10	$176.55	$464.90

1/ Herbicide

Karmex and Sinbar Spray		
Karmex	2 lbs	$ 7.76
Sinbar	1 lb	14.50
Spreader sticker	4 oz	.37
Target N.L.	8 oz	.41
		$23.04
30% area sprayed		$ 6.91

2/ Spray Program

Phygon and Sulfur		
Phygon	.54 lbs	$ 2.92
Sulfur	6.52 lbs	1.30
	1 spray	$ 4.22
Kolo 100		
Kolo 100	7.24 lbs	$ 4.34
	1 spray	$ 4.34
Captan, Sulfur, Vydate and Plictran		
Captan	3.26 lbs	$ 4.89
Sulfur	4.35 lbs	.87
Vydate	2.32 pts	11.23
Plictran	.44 lbs	7.70
	1 spray	$24.69
Captan and Glyodin		
Captan	2.17 lbs	$ 3.26
Glyodin	1.74 pts	2.40
	1 spray	$ 5.66
Captan, Penn Cap M and Sulfur		
Captan	4.35 lbs	$ 6.53
Penn Cap M	2.89 pts	5.14
Sulfur	4.35 lbs	.87
	1 spray	$12.54
Sulfur and Glyodin		
Sulfur	6.52 lbs	$ 1.30
Glyodin	1.74 pts	2.40
	1 spray	$ 3.70

Guthion		
Guthion	.72 lbs	$ 3.20
	1 spray	$ 3.20
Zolone and Plictran		
Zolone	1.74 pts	$ 4.63
Plictran	.58 lbs	10.15
	1 spray	$14.78
Guthion		
Guthion	.72 lbs	$ 3.20
	1 spray	$ 3.20
Total Spray Program		
9 sprays		$76.33

3/ Thinning Spray

Fructone N	2 oz	$ .59
Sevin	2 lbs	3.20
		$3.79

4/ Prune and Train
$118.80 per acre

5/ Mousebait
Zinc phosphide corn 10 lbs/acre $4.10

6/ Brush Removal
Two additional labor hours per acre are required to prepare brush for chopping.

7/ Lime
Custom application every 5 years to maintain soil ph of 5.6 - 6.0.
3 tons/acre x $22.75/ton = $68.25 ($13.65 per year)

8/ Bee Rental
One hive per 3 acres at $25.00/hive

9/ Includes charges for liability insurance, utilities and office/ accounting expenses.

Table 12. Mature Medium Density, Processing Apple Orchard Production Costs, 218 Trees Per Acre, 1977-81 Basis

Item	Item Total, 1981	Item Total, 1977-1981 Average
Labor	$180.69	$155.86
Equipment	77.10	58.60
Fertilizer	63.44	50.29
Mousebait	4.10	3.62
Chemical thinner	3.79	3.41
Herbicides	6.91	6.30
Spray materials	76.33	68.91
Lime, custom	13.65	10.94
Bee rental	8.33	7.08
Other	30.56	25.22
		$390.23

Table 13. Income and Expenses for a Mature Low Density, Processing Apple Orchard, 121 Trees Per Acre, 1977-81 Basis

Item	1977-81 Average
Income	
Yield, bushels/acre	550
Price, $ per bushel[1]	$2.19
Value of production	$1,205
Expenses	
Variable	
Growing	$ 368
Harvesting[2]	472
Transportation to packer[3]	67
Interest[4]	21
Management, 5% of value	60
Fixed	
Equipment and buildings[5]	205
Expenses Before Property Taxes	$1,193
Property Taxes	$ 4
Total Expenses	$1,197
Return to Land	$ 8

[1]1977-81 average price for processing apples reported by the New York Crop Reporting Service, less Marketing Order assessment.

[2]Harvesting costs of 85.8¢ per bushel during 1977-1981 based on Gerling, W.D., A Survey of the Cost of Growing and Harvesting Apples in Eastern New York, 1979-81, and Lawrence, Ralph T., A Survey of the Cost of Growing and Harvesting Apples in Eastern New York, 1977 and 1978, Cooperative Extension, Hudson Valley Laboratory, Highland, New York. Their cost per bushel included charges for depreciation and interest on containers. These charges were deducted because our equipment set includes containers. Cooperative Extension personnel estimated that processing apples required 8.6¢/bushel less to harvest than fresh apples.

[3]Transportation and labor charge of 12.1¢ per bushel.

[4]Interest @ 11.46% on growing costs for 6 months.

[5]Fixed costs of $68.00 per acre associated with the deer control fence and apple bins have been excluded.

Table 14. Mature Low Density, Processing Apple Orchard Production Costs, 121 Trees Per Acre, 1981 Basis

Operation	Labor Hours	Equipment Hours	Labor Cost	Equipment Cost	Materials Cost	Total Cost
Herbicide[1]	.7	.5	$ 3.47	$ 1.85	$ 6.91	$ 12.23
Spraying (9x)[2]	3.9	3.0	19.31	38.34	76.33	133.98
Chemical thinning[3]	.4	.3	1.98	3.83	3.79	9.60
Prune and train[4]	24.0	--	118.80	--	--	118.80
Mousebait[5]	.4	.3	1.98	1.02	4.10	7.10
Fertilizer	.4	.3	1.98	1.02	35.21	38.21
Mow (4x)	3.4	2.6	16.83	22.67	--	39.50
Brush removal[6]	3.3	1.0	16.34	8.37	--	24.71
Lime[7]	custom	--	--	--	13.65	13.65
Bee rental[8]	--	--	--	--	8.33	8.33
Other[9]						30.56
Total	36.5	8.0	$180.69	$77.10	$148.32	$436.67

1/ Herbicide

Karmex and Sinbar Spray		
Karmex	2 lbs	$ 7.76
Sinbar	1 lb	14.50
Spreader sticker	4 oz	.37
Target N.L.	8 oz	.41
		$23.04
30% area sprayed		$ 6.91

2/ Spray Program

Phygon and Sulfur		
Phygon	.54 lbs	$ 2.92
Sulfur	6.52 lbs	1.30
	1 spray	$ 4.22
Kolo 100		
Kolo 100	7.24 lbs	$ 4.34
	1 spray	$ 4.34
Captan, Sulfur, Vydate and Plictran		
Captan	3.26 lbs	$ 4.89
Sulfur	4.35 lbs	.87
Vydate	2.32 pts	11.23
Plictran	.44 lbs	7.70
	1 spray	$24.69
Captan and Glyodin		
Captan	2.17 lbs	$ 3.26
Glyodin	1.74 pts	2.40
	1 spray	$ 5.66
Captan, Penn Cap M and Sulfur		
Captan	4.35 lbs	$ 6.53
Penn Cap M	2.89 pts	5.14
Sulfur	4.35 lbs	.87
	1 spray	$12.54
Sulfur and Glyodin		
Sulfur	6.52 lbs	$ 1.30
Glyodin	1.74 pts	2.40
	1 spray	$ 3.70

Guthion		
Guthion	.72 lbs	$ 3.20
	1 spray	$ 3.20
Zolone and Plictran		
Zolone	1.74 pts	$ 4.63
Plictran	.58 lbs	10.15
	1 spray	$14.78
Guthion		
Guthion	.72 lbs	$ 3.20
	1 spray	$ 3.20
Total Spray Program		
9 sprays		$ 76.33

3/ Thinning Spray

Fructone N	2 oz	$ .59
Sevin	2 lbs	3.20
		$3.79

4/ Prune and Train
$118.80 per acre

5/ Mousebait
Zinc phosphide corn 10 lbs/acre $4.10

6/ Brush Removal
Two additional labor hours per acre are required to prepare brush for chopping.

7/ Lime
Custom application every 5 years to maintain soil ph of 5.6 - 6.0.
3 tons/acre x $22.75/ton = $68.25 ($13.65 per year)

8/ Bee Rental
One hive per 3 acres at $25.00/hive

9/ Includes charges for liability insurance, utilities and office/ accounting expenses

Table 15. Mature Low Density, Processing Apple Orchard Production Costs, 121 Trees Per Acre, 1977-81 Basis

Item	Item Total, 1981	Item Total, 1977-1981 Average
Labor	$180.69	$155.86
Equipment	77.10	58.60
Fertilizer	35.21	27.91
Mousebait	4.10	3.62
Chemical thinner	3.79	3.41
Herbicides	6.91	6.30
Spray materials	76.33	68.91
Lime, custom	13.65	10.94
Bee rental	8.33	7.08
Other	30.56	25.22
		$367.85

Table 16. Income and Expenses for a Mature Low Density, Processing Apple Orchard, 27 Trees Per Acre, 1977-81 Basis

Item	1977-81 Average
Income	
Yield, bushels/acre	500
Price, $ per bushel[1]	$2.19
Value of production	$1,095
Expenses	
Variable	
Growing	$ 343
Harvesting[2]	429
Transportation to packer[3]	61
Interest[4]	20
Management, 5% of value	55
Fixed	
Equipment and buildings[5]	205
Expenses Before Property Taxes	$1,113
Property Taxes	$ 2.00
Total Expenses	$1,115
Return to Land	$

[1]1977-81 average price for processing apples reported by the New York Crop Reporting Service, less Marketing Order assessment.

[2]Harvesting costs of 85.8¢ per bushel during 1977-1981 based on Gerling, W.D., A Survey of the Cost of Growing and Harvesting Apples in Eastern New York, 1979-81, and Lawrence, Ralph T., A Survey of the Cost of Growing and Harvesting Apples in Eastern New York, 1977 and 1978, Cooperative Extension, Hudson Valley Laboratory, Highland, New York. Their cost per bushel included charges for depreciation and interest on containers. These charges were deducted because our equipment set includes containers. Cooperative Extension personnel estimated that processing apples required 8.6¢/bushel less to harvest than fresh apples.

[3]Transportation and labor charge of 12.1¢ per bushel.

[4]Interest @ 11.46% on growing costs for 6 months.

[5]Fixed costs of $68.00 per acre associated with the deer control fence and apple bins have been excluded.

Table 17. Mature Low Density, Processing Apple Orchard Production Costs, 27 Trees Per Acre, 1981 Basis

Operation	Labor Hours	Equipment Hours	Labor Cost	Equipment Cost	Materials Cost	Total Cost
Herbicide[1]	.4	.3	$ 1.98	$ 1.11	$ 6.91	$ 10.00
Spraying (9x)[2]	2.0	1.5	9.90	19.17	113.75	142.82
Chemical thinning[3]	.3	.2	1.49	2.56	3.79	7.84
Prune and train[4]	21.8	--	108.00	--	--	108.00
Mousebait[5]	.4	.3	1.98	1.02	4.10	7.10
Fertilizer	.1	.1	.50	.34	7.86	8.70
Mow (4x)	3.4	2.6	16.83	22.67	--	39.50
Brush removal[6]	3.3	1.0	16.34	8.37	--	24.71
Lime[7]	custom	--	--	--	13.65	13.65
Bee rental[8]	--	--	--	--	8.33	8.33
Other[9]						30.56
Total	31.7	6.0	$157.02	$55.24	$158.39	$401.21

1/ Herbicide

Karmex and Sinbar Spray		
Karmex	2 lbs	$ 7.76
Sinbar	1 lb	14.50
Spreader sticker	4 oz	.37
Target N.L.	8 oz	.41
		$23.04
30% area sprayed		$ 6.91

2/ Spray Program

Phygon and Sulfur		
Phygon	.81 lbs	$ 4.37
Sulfur	9.73 lbs	1.95
	1 spray	$ 6.32
Kolo 100		
Kolo 100	10.81 lbs	$ 6.49
	1 spray	$ 6.49
Captan, Sulfur, Vydate and Plictran		
Captan	4.86 lbs	$ 7.29
Sulfur	6.49 lbs	1.30
Vydate	3.46 pts	16.75
Plictran	.65 lbs	11.38
	1 spray	$36.72
Captan and Glyodin		
Captan	3.24 lbs	$ 4.86
Glyodin	2.59 pts	3.57
	1 spray	$ 8.43
Captan, Penn Cap M and Sulfur		
Captan	6.49 lbs	$ 9.74
Penn Cap M	4.32 pts	7.69
Sulfur	6.49 lbs	1.30
	1 spray	$18.73

Sulfur and Glyodin		
Sulfur	9.73 lbs	$ 1.95
Glyodin	2.59 pts	3.57
	1 spray	$ 5.52
Guthion		
Guthion	1.08 lbs	$ 4.80
	1 spray	$ 4.80
Zolone and Plictran		
Zolone	2.59 pts	$ 6.89
Plictran	.86 lbs	15.05
	1 spray	$21.94
Guthion		
Guthion	1.08 lbs	$ 4.80
	1 spray	$ 4.80
Total Spray Program		
9 sprays		$113.75

3/ Thinning Spray

Fructone N	2 oz	$ .59
Sevin	2 lbs	3.20
		$3.79

4/ Prune and Train
$108.00 per acre

5/ Mousebait

Zinc phosphide corn	10 lbs/acre	$4.10

6/ Brush Removal
Two additional labor hours per acre are required to prepare brush for chopping.

7/ Lime
Custom application every 5 years to maintain soil ph of 5.6 - 6.0.
3 tons/acre x $22.75/ton = $68.25 ($13.65 per year)

8/ Bee Rental
One hive per 3 acres at $25.00/hive

9/ Includes charges for liability insurance, utilities and office/ accounting expenses.

Table 18. Mature Low Density, Processing Apple Orchard Production Costs, 27 Trees Per Acre, 1977-81 Basis

Item	Item Total, 1981	Item Total, 1977-1981 Average
Labor	$157.02	$135.36
Equipment	55.24	41.98
Fertilizer	7.86	6.23
Mousebait	4.10	3.62
Chemical thinner	3.79	3.41
Herbicides	6.91	6.30
Spray materials	113.75	102.66
Lime, custom	13.65	10.94
Bee rental	8.33	7.08
Other	30.56	25.22
		$342.80

Table 19. Equipment and Building Complement for an 85 Acre Fruit Farm, 1981 Basis

Item	1981 new cost	1977-81 cost	Depreciation[1]	Interest[2]
Equipment, 10 year life				
Tractor, 40 hp diesel	$ 12,700			
Tractor, 70 hp diesel	20,000			
Crop sprayer, motorized	27,000			
Weed sprayer	2,000			
Plow - 3 16"	1,800			
Disc harrow, 13'	4,950			
Spring tooth harrow - 12'	1,050			
Front end loader	3,850			
Forklift attachment	575			
Forklift attachment	5,000			
Trailers	2,454			
Ladders, 24 @ $105	2,520			
Bins, 1400 @ $35	49,000			
Shop equipment	22,122			
	$155,021	$82,161	$7,395	$5,179
Equipment, 5 year life				
Flatbed truck (used)	$ 5,000			
Flail chopper	7,664			
Picking buckets	638			
Fertilizer spreader	1,275			
	$ 14,577	$ 9,767	$1,758	$ 616
Equipment, 3 year life				
Rotary mower	$ 6,820	$ 5,115	$1,534	$ 322
Total Equipment	$176,418	$97,043	$10,687	$6,117
Buildings and Fence, 15 year life				
Fence	$ 16,741			
Bin shed - 30' x 40'	9,600			
Shop - 30' x 40'	14,400			
Pole shed - 50' x 50'	17,500			
	$ 58,241	$30,285	$ 2,019	$1,735

[1]Straight line with 10 percent salvage value on equipment, zero salvage value on buildings and fence.

[2]Interest at 11.46 percent on average value

Depreciation	$12,706	
Interest	7,852	
Insurance	1,910	(1.5 percent of 1977-81 cost)
Repairs-Buildings and fence	757	(2.5 percent of 1977-81 cost)
	$23,225/85 acres = $273.24/acre	

Table 20. Fresh Market and Processing Apple Orchards, Tractor and Equipment Operating Costs, 1981 Basis

Item	Cash operating cost per hour (dollars)			Tractor and Implement, Total Cost per hour
	Fuel, oil and Lubricants	Repairs and Maintenance	Total	
Tractor, 40 hp diesel 1/	$2.64	$ .43	$3.07	
Tractor, 70 hp diesel,	4.62	1.54	6.16	
Tractor, 70 hp diesel, to plow	6.14	1.54	7.68	
Crop sprayer	3.47	3.15	6.62	$12.78
Rotary mower		2.56	2.56	8.72
Brush Chopper		2.21	2.21	8.37
Plow 3-16"		.45	.45	8.13
Disc		1.16	1.16	7.32
Front End Loader		.99	.99	7.15
Weed Sprayer (PTO)		.63	.63	3.70
Fertilizer Spreader		.34	.34	3.41
Harrow - 12', spring tooth		.19	.19	3.26

1/Diesel fuel at $1.31 per gallon as reported in New York Agricultural Statistics 1981, New York Crop Reporting Service, page 64.

Table 21. Input Prices, Fresh Market and Processing Apple Orchards, 1981 Basis

Trees: $4.99 each

Pesticides, Fungicides and Chemicals

Alar	$16.78 per pound
Captan 50 WP	1.50 per pound
Difolatan	26.25 per gallon
Fructone N	4.74 per pound
Glyodin	11.00 per gallon
Guthion 50 WP	4.44 per pound
Kolo 100	.60 per pound
Mousebait	.41 per pound
Phygon	5.40 per pound
Penn Cap M	14.35 per gallon
Plictran	17.50 per pound
Sevin 50 WP	1.60 per pound
Spreader sticker	11.95 per gallon
Sulfur	.20 per pound
Target N.L.	6.50 per gallon
Thiodan	3.70 per pound
Vydate	38.75 per gallon
Zolone	21.25 per gallon

Herbicides

Dacamine	$17.15 per gallon
Karmex 80 WP	3.88 per pound
Paraquat	42.50 per gallon
Princep 80 WP	3.65 per pound
Sinbar 80 WP	14.50 per pound

Fertilizers

10-10-10	$182.00 per ton
20-20-20 (soluble)	.53 per pound
Ammonium Nitrate	193.00 per ton
Calcium Nitrate	199.00 per ton
Sulphomag	174.00 per ton

Miscellaneous

Diesel fuel	$ 1.31 per gallon
Labor rate	4.95 per hour
Grass seed mixture	
Alba fescue 5 pounds	$ 4.25
Kentucky Blue Grass 15 pounds	22.50
Seed oats 1 bushel	5.85
Total	$32.60

Rye	$ 7.00 per 100 pounds
Tree guards (18" x 18" - 1/4" hardware cloth)	$ 1.31 each
Tree spreaders	$ .08 each

Each hour of equipment use requires 1.3 labor hours

The use of trade or brand names is not intended to serve as an endorsement of any of the products mentioned.

VINEYARD APPENDIX TABLES

Table 22. Income and Expenses for a Mature Concord Vineyard, 605 Vines Per Acre, 1977-1981 Basis

Item	1977-81 Average
Income	
Yield, tons/acre	4.30
Price, $ per ton[1]	$ 203
Value of production	$ 873
Expenses	
Variable	
Growing	$463
Harvesting[2]	127
Interest[3]	27
Management, 5% of value	44
Fixed	
Equipment and buildings	111
Trellis	49
Expenses Before Property Taxes	$821
Property taxes	$ 8
Total Expenses	$829
Return to Land	$ 44

[1]1977-81 average annual New York State price.

[2]1977-81 average harvesting and hauling charge of $29.45 per ton.

[3]11.46% on growing costs for 6 months.

Table 23. Income and Expenses for a Mature Catawba Vineyard, 605 Vines Per Acre, 1977-1981 Basis

Item	1977-81 Average
Income	
Yield, tons/acre	3.12
Price, $ per ton[1]	$ 289
Value of production	$ 902
Expenses	
Variable	
Growing	$463
Harvesting[2]	92
Interest[3]	27
Management, 5% of value	45
Fixed	
Equipment and buildings	111
Trellis	49
Expenses Before Property Taxes	$787
Property taxes	$ 16
Total Expenses	$803
Return to Land	$ 99

[1]1977-81 average annual New York State price.

[2]1977-81 average harvesting and hauling charge of $29.45 per ton.

[3]11.46% on growing costs for 6 months.

Table 24. Income and Expenses for a Mature Niagara Vineyard, 605 Vines Per Acre, 1977-1981 Basis

Item	1977-81 Average
Income	
Yield, tons/acre	3.81
Price, $ per ton[1]	$ 239
Value of production	$ 911
Expenses	
Variable	
Growing	$463
Harvesting[2]	112
Interest[3]	27
Management, 5% of value	46
Fixed	
Equipment and buildings	111
Trellis	49
Expenses Before Property Taxes	$808
Property taxes	$ 14
Total Expenses	$822
Return to Land	$ 89

[1]1977-81 average annual New York State price.

[2]1977-81 average harvesting and hauling charge of $29.45 per ton.

[3]11.46% on growing costs for 6 months.

Table 25. Income and Expenses for a Mature Delaware Vineyard, 605 Vines Per Acre, 1977-1981 Basis

Item	1977-81 Average
Income	
Yield, tons/acre	2.55
Price, $ per ton[1]	$ 391
Value of production	$ 997
Expenses	
Variable	
Growing	$463
Harvesting[2]	75
Interest[3]	27
Management, 5% of value	50
Fixed	
Equipment and buildings	111
Trellis	49
Expenses Before Property Taxes	$775
Property taxes	$ 30
Total Expenses	$805
Return to Land	$192

[1]1977-81 average annual New York State price.

[2]1977-81 average harvesting and hauling charge of $29.45 per ton.

[3]11.46% on growing costs for 6 months.

Table 26. Income and Expenses for a Mature Dutchess Vineyard, 605 Vines Per Acre, 1977-1981 Basis

Item	1977-81 Average
Income	
Yield, tons/acre	1.96
Price, $ per ton[1]	$ 446
Value of production	$ 874
Expenses	
Variable	
Growing	$463
Harvesting[2]	58
Interest[3]	27
Management, 5% of value	44
Fixed	
Equipment and buildings	111
Trellis	49
Expenses Before Property Taxes	$752
Property taxes	$ 17
Total Expenses	$769
Return to Land	$105

[1]1977-81 average annual New York State price.

[2]1977-81 average harvesting and hauling charge of $29.45 per ton.

[3]11.46% on growing costs for 6 months.

Table 27. Mature Concord, Catawba, Niagara, Delaware, and Dutchess Vineyard Production Costs, 605 Vines per Acre, 1981 Basis

Operation	Labor Hours	Equipment Hours	Labor Cost	Equipment Cost	Materials Cost	Total
Fall fertilization[1]	.3	.2	$ 1.49	$ .93	$ 11.04	$ 13.46
Pruning	22¢/vine	--	133.10	--	--	133.10
Brush pulling	3.3¢/vine	--	19.97	--	--	19.97
Brush chopping	.7	.5	3.47	1.96	--	5.43
Trellis maintenance[2]	1.0	.5	4.95	1.96	6.96	13.87
Tying (umbrella)[3]	20.0	--	99.00	--	5.74	104.74
Spring fertilizer	.7	.5	3.47	2.32	20.37	26.16
Layering	2.0	--	9.90	--	--	9.90
Weed spray (1.5x)[4]	2.0	1.5	9.90	7.25	11.68	28.83
Suckering & Sprouting	3.0	--	14.85	--	--	14.85
Diseased & dead trunk removal	1.0	--	4.95	--	--	4.95
Tillage (2x)[5]	3.4	2.6	16.83	13.44	--	30.27
Tillage (1x)	1.7	1.3	8.42	5.59	--	14.01
Spraying (4x)[6]	2.6	2.0	12.87	9.80	44.27	66.94
Cover crop - seeding[7]	.7	.5	3.47	2.32	8.40	14.19
Mowing	.7	.5	3.47	2.12	--	5.59
Push-up, etc.[8]	.5	.4	2.48	1.61	--	4.09
Lime[9]	custom	--	--	--	3.20	3.20
Other[10]						30.56
Total	71.2	10.5	$352.59	$49.30	$111.66	$544.11

1/ Fertilizers

Fall	Potash	133 lbs per acre	$11.04
Spring	Ammonium nitrate	210 lbs per acre	20.37

2/ Trellis Maintenance

Average of 2 posts per year $6.96

Trellis Construction

208	3" posts	$723.84
16	4" anchors	74.08
9.2 lbs	#10 high tensile wire	5.38
7 lbs	staples	3.40
400 lbs	#11 wire	226.00
	Materials	$1,032.70
Labor and machinery costs		249.53
	Total	$1,282.23

3/ Tying:

2 lbs of twine	$1.54
2 lbs of wire	4.20
	$5.74

4/ Herbicides			3 qts	$53.21
Roundup Spray	1/3 area sprayed			$17.74
	used on 1/4 acreage			$ 4.43
Karmex Spray			5 lbs	$17.80
	1/3 area sprayed			$ 5.93
Paraquat Spray			1.5 qts	$15.50
Charger E			4 oz	.37
				$15.87
	1/3 area sprayed			$ 5.29
	used on 1/4 acreage			$ 1.32
Total: Karmex Spray			1 application	$ 5.93
Paraquat Spray			1 application	1.32
Roundup			1 application	4.43
				$11.68

5/ Tillage
Large disc used 2x
Small disc used 1x

6/ Spray Program

Concord only

Prebloom		
Alar	1 lb	$16.40
Folpet	2 lbs	4.06
1 application		$20.46
First Postbloom		
Folpet	4 lbs	$ 8.12
Sevin	4 lbs	6.64
Spreader sticker	2 oz	.19
1 application		$14.95
Second Postbloom		
Karathane	1.5 lbs	$ 4.76
Sevin	3 lbs	4.98
Spreader sticker	2 oz	.19
1 application		$ 9.93
Midsummer		
Copper	4 lbs	$ 5.12
Lime	8 lbs	.64
Parathion	3 lbs	2.19
Spreader sticker	8 oz	.76
1 application		$ 8.71
Total Concord spray program		$54.05

Catawba, Niagara, Delaware and Dutchess

Prebloom		
Folpet	2 lbs	$ 4.06
1 application		$ 4.06
First Postbloom		
Folpet	4 lbs	$ 8.12
Sevin	4 lbs	6.64
Spreader sticker	2 oz	.19
1 application		$14.95
Second Postbloom		
Captan	4 lbs	$ 6.36
Sevin	4 lbs	6.64
Sulfur	4 lbs	.84
Spreader sticker	2 oz	.19
1 application		$14.03
Midsummer		
Copper	4 lbs	$ 5.12
Lime	9 lbs	.72
Parathion	3 lbs	2.19
Spreader sticker	8 oz	.76
1 application		$ 8.79
Total Catawba, Niagara, Delaware and Dutchess spray program		$41.83

Weighted average Sprays - Concord, Catawba, Niagara, Delaware and Dutchess spray program. $44.27

7/ Cover Crop
120 lbs Rye at $7.00/cwt = $8.40

8/ Push-up
20% of the acreage is pushed up each year
Each acre requires 2 machine hours
2 hours/acre x 55 acres x 20% = 22 hours per year

$$\frac{22 \text{ hours}}{55 \text{ acres}} = .4 \text{ hour per acre}$$

9/ Lime
Average custom application of one ton every 10 years costing $32.00 per ton.

10/ Includes charges for liability insurance, utilities and office/ accounting expenses.

Table 28. Mature Concord, Niagara, Catawba, Delaware, and Dutchess Vineyard Production Costs, 605 Vines Per Acre, 1977-81 Basis

Item	Item Total 1981	Item Total 1977-81 Average
Labor	$352.59	$304.02
Equipment	49.30	37.47
Fertilizer	31.41	25.21
Herbicides	11.68	10.56
Spray materials	44.27	40.05
Tying materials	5.74	4.72
Seed	8.40	7.08
Lime	3.20	3.00
Trellis materials	6.96	6.08
Other	30.56	25.22
		$463.41

Table 29. Income and Expenses for a Mature French Hybrid (Aurore) Vineyard, 691 Vines Per Acre, 1977-1981 Basis

Item	1977-81 Average
Income	
Yield, tons/acre	3.66
Price, $ per ton[1]	$ 352
Value of production	$1,288
Expenses	
Variable	
Growing	$584
Harvesting[2]	108
Interest[3]	33
Management, 5% of value	64
Fixed	
Equipment and buildings	111
Trellis	49
Expenses Before Property Taxes	$949
Property taxes	$ 45
Total Expenses	$994
Return to Land	$294

[1]1977-81 average annual New York State price.

[2]1977-81 average harvesting and hauling charge of $29.45 per ton.

[3]11.46% on growing costs for 6 months.

Table 30. Income and Expenses for a Mature French Hybrid (de Chaunac) Vineyard, 691 Vines Per Acre, 1977-1981 Basis

Item	1977-81 Average
Income	
Yield, tons/acre	3.92
Price, $ per ton[1]	$ 265
Value of production	$1,039
Expenses	
Variable	
Growing	$584
Harvesting[2]	115
Interest[3]	33
Management, 5% of value	52
Fixed	
Equipment and buildings	111
Trellis	49
Expenses Before Property Taxes	$944
Property taxes	$ 13
Total Expenses	$957
Return to Land	$ 82

[1]1977-81 average annual New York State price.

[2]1977-81 average harvesting and hauling charge of $29.45 per ton.

[3]11.46% on growing costs for 6 months.

Table 31. Mature French Hybrid (Aurore or de Chaunac) Vineyard Production Costs, 691 Vines per Acre, 1981 Basis

Operation	Labor Hours	Equipment Hours	Labor Cost	Equipment Cost	Materials Cost	Total
Fall fertilization[1]	.3	.2	$ 1.49	$ .93	$ 11.04	$ 13.46
Pruning	22¢/vine	--	152.02	--	--	152.02
Brush pulling	3.3¢/vine	--	22.80	--	--	22.80
Brush chopping	.7	.5	3.47	1.96	--	5.43
Thinning	15.0	--	74.25	--	--	74.25
Trellis maintenance[2]	1.0	.5	4.95	1.96	6.96	13.87
Tying (umbrella)[3]	20.0	--	99.00	--	5.74	104.74
Spring fertilizer	.7	.5	3.47	2.32	20.37	26.16
Layering	2.0	--	9.90	--	--	9.90
Weed spray (1.5x)[4]	2.0	1.5	9.90	7.25	11.68	28.83
Suckering & Sprouting	9.0	--	44.55	--	--	44.55
Diseased & dead trunk removal	2.0	--	9.90	--	--	9.90
Tillage (2x)[5]	3.4	2.6	16.83	13.44	--	30.27
Tillage (1x)	1.7	1.3	8.42	5.59	--	14.01
Spraying (4x)[6]	2.6	2.0	12.87	9.80	53.27	75.94
Cover crop - seeding[7]	.7	.5	3.47	2.32	8.40	14.19
Mowing	.7	.5	3.47	2.12	--	5.59
Push-up, etc.[8]	.5	.4	2.48	1.61	--	4.09
Lime[9]	custom	--	--	--	3.20	3.20
Other[10]						30.56
Total	97.6	10.5	$483.24	$49.30	$120.66	$683.76

1/ Fertilizers

Fall	Potash	133 lbs per acre	$11.04
Spring	Ammonium nitrate	210 lbs per acre	20.37

2/ Trellis Maintenance

Average of 2 posts per year $6.96

Trellis Construction

208	3" posts	$723.84
16	4" anchors	74.08
9.2 lbs	#10 high tensile wire	5.38
7 lbs	staples	3.40
400 lbs	#11 wire	226.00
	Materials	$1,032.70
Labor and machinery costs		249.53
	Total	$1,282.23

3/ Tying:

2 lbs of twine	$1.54
2 lbs of wire	4.20
	$5.74

4/ Herbicides

Roundup Spray		3 qts	$53.21
	1/3 area sprayed		$17.74
	used on 1/4 acreage		$ 4.43
Karmex Spray		5 lbs	$17.80
	1/3 area sprayed		$ 5.93
Paraquat Spray		1.5 qts	$15.50
Charger E		4 oz	.37
			$15.87
	1/3 area sprayed		$ 5.29
	used on 1/4 acreage		$ 1.32

Total:	Karmex Spray	1 application	$ 5.93
	Paraquat Spray	1 application	1.32
	Roundup	1 application	4.43
			$11.68

5/ Tillage

Large disc used 2x
Small disc used 1x

6/ Spray Program

Prebloom

Captan	2 lbs	$ 3.18
Sulfur	2 lbs	.42
Spreader sticker	2 oz	.19
1 application		$ 3.79

First Postbloom

Captan	4 lbs	$ 6.36
Sevin	4 lbs	6.64
Sulfur	4 lbs	.84
Spreader sticker	2 oz	.19
1 application		$14.03

Second Postbloom

Captan	4 lbs	$ 6.36
Sevin	4 lbs	6.64
Sulfur	4 lbs	.84
Spreader sticker	2 oz	.19
1 application		$14.03

Midsummer

Captan	4 lbs	$ 6.36
Sulfur	4 lbs	.84
Spreader sticker	2 oz	.19
1 application		$ 7.39

Late Summer		
Captan	4 lbs	$ 6.36
Sevin	4 lbs	6.64
Sulfur	4 lbs	.84
Spreader sticker	2 oz	.19
1 application		$14.03
Total spray program		$53.27

7/ Cover Crop
120 lbs Rye at $7.00/cwt = $8.40

8/ Push-up
20% of the acreage is pushed up each year
Each acre requires 2 machine hours
2 hours/acre x 55 acres x 20% = 22 hours per year

$$\frac{22 \text{ hours}}{55 \text{ acres}} = .4 \text{ hour per acre}$$

9/ Lime
Average custom application of one ton every 10 years costing $32.00 per ton.

10/ Includes charges for liability insurance, utility and office/accounting expenses.

Table 34. Vineyard Tractor and Equipment Operating Costs, 1981 Basis

Item	Cash operating cost per hour (dollars)			Tractor and Implement, Total Cost per hour
	Fuel, oil and Lubricants	Repairs and Maintenance	Total	
Tractor, 40 hp diesel 1/	$2.64	$1.11	$3.75	
Tractor, 40 hp diesel, to plow	3.51	1.11	4.62	
Planter, (rent for $25.00 per day or $6.25 per hour)				$10.00
Disc, 24"		1.42	1.42	5.17
Crop Sprayer		1.15	1.15	4.90
Plow, 2-16"		.25	.25	4.87
Weed Sprayer		1.08	1.08	4.83
Fertilizer Spreader		.88	.88	4.63
Disc, 16"		.55	.55	4.30
Mower		.48	.48	4.23
Post Driver		.29	.29	4.04
Mechanical hoe		.27	.27	4.02
Brush Chopper		.17	.17	3.92
Trailer		.16	.16	3.91
Auger		.05	.05	3.80

1/Diesel fuel at $1.31 per gallon as reported in New York Agricultural Statistics 1981, New York Crop Reporting Service, page 64.

Table 35. Input Prices, Vineyards, 1981 Basis

Vines: Native varieties - .58¢ each
French Hybrid varieties - .53¢ each

Pesticides, Fungicides and Chemicals

Alar	$16.40 per pound
Captan 50 WP	1.59 per pound
Charger E	11.90 per gallon
Copper 50%	1.28 per pound
Folpet 50 WP	2.03 per pound
Karathane WP	3.17 per pound
Parathion 15 WP	.73 per pound
Sevin 50 WP	1.66 per pound
Spray lime	.08 per pound
Spreader sticker	12.15 per gallon
Sulfur 95 WP	.21 per pound

Herbicides

Karmex 80 WP	$ 3.56 per pound
Paraquat	41.33 per gallon
Princep 80 WP	3.38 per pound
Roundup	70.94 per gallon

Fertilizers

10-20-20	$223.00 per ton
Ammonium nitrate	193.00 per ton
Potash	165.00 per ton
Lime, spread	32.00 per ton

Trellis Materials

Posts - 3"	$ 3.48 each
Anchors - 4"	4.63 each
#10 wire - high tensile	58.50 per 100 pounds
#11 wire	56.50 per 100 pounds
Staples	24.30 per 50 pounds
Twine	19.25 per 25 pounds
Tying wire	2.10 per pound

Miscellaneous

Diesel fuel	$ 1.31 per gallon
Labor rate	4.95 per hour
Rye	7.00 per 100 pounds

Each hour of equipment use requires 1.3 labor hours

The use of trade or brand names is not intended to serve as an endorsement of any of the products mentioned.

Table 36. Index Factors used to Convert 1981 Costs to a 1977-81 Average, Orchard and Vineyard Analysis

Item	1977-81 Index Factor
Investments	
Power and Equipment	
10 year life	.53
9 year life	.55
5 year life	.67
3 year life	.75
Trellis	.38
Buildings	.52
Production Items	
Other items used for production	.84
Equipment repairs	.82
Commodities, Services, Interest, Taxes and Wage rates	.83
Equipment operation	.76
Fuels	.70

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